UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202 – 2733

September 6, 2019

Mr. Miguel Montoya
Quality Assurance Officer
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, NM 87502-5469

Dear Mr. Montoya:

We have reviewed the Quality Assurance Project Plan (QAPP) entitled "*Planning and Conducting "All Hands" Rapid Assessment Method Data Collection Campaign for the Assessment of New Mexico Wetlands"* for Clean Water Act 104(b)(3) Cooperative Agreement CD-01F10901. I am pleased to inform you that it was approved on September 5, 2019.

This new QAPP will expire on September 5, 2021. Should there be any changes to the QAPP at any time, please submit a revised document to EPA for approval. If the project continues under a new cooperative agreement and there are no substantive technical or programmatic changes, please submit a letter stating that no changes are needed. The letter or revised document is due at least 60 days prior to the expiration date.

Attached is the completed QAPP signature page for your records. In any future correspondence relating to this QAPP, please reference QTRAK #19-412. If you have any questions, you may contact me at (214) 665-2773.

Sincerely,

Leslie C. Rauscher

Leslie Rauscher
Project Officer
State/Tribal Programs Section

Attachment; sent via email, no hardcopy to follow.

Planning and Conducting "All Hands" Rapid Assessment Method Data Collection Campaign for the Assessment of New Mexico Wetlands

CWA Section 104(b)(3) Wetlands Development Grant

CD# 01F109-01-0D (FY2016)

Quality Assurance Project Plan

Submitted by:
New Mexico Environment Department
Surface Water Quality Bureau

A Project Management

A1 Title and Approval Sheet

_____ Date: 8/15/2019
Maryann McGraw
Wetlands Program Coordinator, SWQB

_____ Date: 8/15/2019
Miguel Montoya
Quality Assurance Officer, SWQB

_____ Date: 8/16/2019
Abraham Franklin
Program Manager, SWQB Watershed Protection Section

_____ Date: 9/5/19
Leslie Rauscher
Project Officer, WQPD, EPA Region 6

_____ Date: 9-5-19
Barbara Schrodt
Chief, State and Tribal Programs Section, WQPD, EPA Region 6

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A2 Table of Contents

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A2.1 Acronyms

CRAM	California Rapid Assessment Method
CWA	Clean Water Act
CWA 404	Section 404 of the Clean Water Act
DQI	Data Quality Indicators
DQO	Data quality Objectives
EPA	United States Environmental Protection Agency
FY	Fiscal Year
GIS	Geographic Information Systems
GPS	Geographic Positioning System
HGM	Hydrogeomorphic Method
HUC	Hydrologic Unit Codes
IT	Information Technology
MQO	Measurement Quality Objectives
NA	Not Applicable
NEPA	National Environmental Policy Act
NHNM	Natural Heritage New Mexico, University of New Mexico
NMED	New Mexico Environment Department
NMRAM	New Mexico Rapid Assessment Method
NWI	National Wetlands Inventory
OERR	Office of Emergency and Remedial Response
PDF	Portable Document Format
PO	Project Officer
PPE	Personal Protective Equipment
QA	Quality Assurance
QAO	Quality Assurance Officer
QC	Quality Control
QAPP	Quality Assurance Project Plan
RA	Rapid Assessment
RID	Request Identification Number
SA	Sample Area
SOP	Standard Operating Procedures
SQUID	Surface Water Quality Information Database
SWCA	SWCA, Inc.
SWQB	New Mexico Environment Department Surface Water Quality Bureau
U	University
USACE	United States Department of the Army Corps of Engineers
US EPA	United States Environmental Protection Agency
WOI	Wetland of Interest
WPS	Watershed Protection Section
WPC	Wetlands Program Coordinator

A3 Distribution List

This EPA-approved Quality Assurance Project Plan (QAPP) signed original will be kept on file at SWQB and a copy will be kept on file at the lead contractor's office (Natural Heritage New Mexico, University of New Mexico (NHNM)).

The Wetlands Program Coordinator (WPC) will ensure all members of the distribution list who do not have signature authority to approve this QAPP will review the QAPP and sign the Acknowledgment Statement prior to initiating any work for this project. The signed Acknowledgement Statements (electronic or hard copy) will be collected by the SWQB WPC/File Manager and will be filed with the original approved QAPP in the project files. The NHNM Project Coordinator will ensure that any NHNM staff involved in data collection or analysis for this project have access to a copy of this QAPP, review its contents, and follow its quality assurance procedures.

Table A3.1 lists the names and organization of those on the distribution list and the roles and responsibilities of persons that will collect and/or use the information gathered for the classification verification, wetlands assessment, and multi-metric analyses.

Table A3.1: Distribution List with Roles and Responsibilities

Name	Organization	Role	Responsibilities	Contact Information
Abe Franklin	SWQB	Watershed Protection Section Program Manager	Review of QAPP.	(505) 827-2793 Abe.franklin@state.nm.us
Maryann McGraw	SWQB	Wetlands Program Coordinator, Project Oversite; File Manager, Assessment Team	Principal Investigator, participate in developing NMRAM Field Campaign Planning, assist and oversee volunteer teams and scheduling data collection. Maintain Wetlands Program project files. Review of final project report and key deliverables. Liaison to EPA.	(505) 827-0581 maryann.mcgraw@state.nm.us
Miguel Montoya	SWQB	Quality Assurance Officer (QAO)	Review and approval of QAPP, QA audits, as needed, to assure adherence to the approved QAPP.	(505) 476-3794 Miguel.montoya@state.nm.us
Emile Sawyer	SWQB	Data Collection Team, Wetlands Team, Assessment Team	Assist with Refresher Training and with volunteer teams field data collection.	(505) 827-2827 emile.sawyer.state.nm.us
Esteban Muldavin	NHNM	Rapid Assessment Contractor, NHNM Project Manager, Assessment Team	Project Manager, conduct organizational meeting, participate in developing NMRAM Field Campaign Planning, assist and oversee volunteer teams and scheduling data collection.	(505) 277-3822 ex 228 muldavin@unm.edu

Name	Organization	Role	Responsibilities	Contact Information
Elizabeth Milford	NHNM	Rapid Assessment Contractor, NHNM Project Coordinator, Assessment Team	Project Coordinator, Team Coordinator, compilation of GIS layers for site selection and identifying Subclass, assist volunteers in site selection, protocol and data management, data transfer and distribution activities, conduct organizational meeting, participate in developing NMRAM Field Campaign Planning and refresher training. Ensure NHNM staff follow QAPP protocols.	(505) 277-3822 ex 227 Emilford2@gmail.com
Yvonne Chauvin	NHNM Senior Biologist	Rapid Assessment Contractor, Assessment Team	Assist in refresher training and volunteer NMRAM Data Collection.	(505) 277-3822 ex 227 ydchauvin@gmail.com
Jaqueline Smith	NHNM	Rapid Assessment Contractor, Team Coordinator,	Coordination of organizational meeting, data collection scheduling.	(505) 277-3822 x 231 jwoodsmith@gmail.com
Leslie Rauscher	U.S. EPA	EPA Project Officer	QAPP review and approval	(214) 665-2773 Rauscher.leslie@epa.gov
Barbara Schrodt	U.S. EPA	Chief, Region 6	QAPP review and approval	(214) 665-7138 Schrodt.barbara@epa.gov

A4 Project Task Organization

The SWQB Quality Management Plan (NMED/SWQB. 2019) documents the independence of the QAO from this project. The QAO is responsible for maintaining the official approved QAPP. A project organizational chart (Figure A4.1) displays hierarchy of the project.

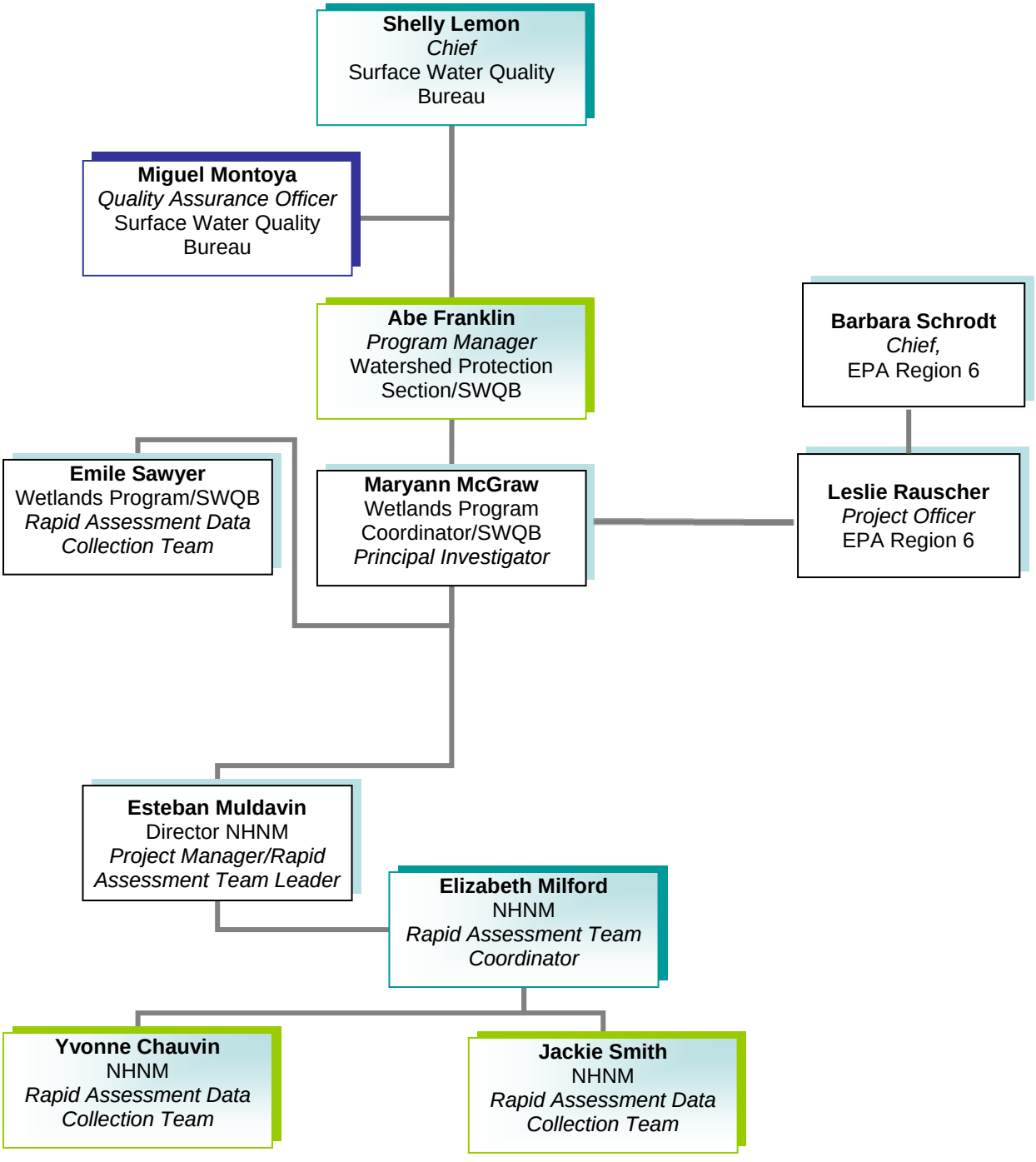

Figure A 4.1: Organizational Chart of Key Personnel.

A5 Problem Definition/Background

SWQB Wetlands Program is in the process of developing rapid assessment methods for New Mexico wetlands by subclass. This rapid assessment project is designed to increase the use of New Mexico Rapid Assessment Method (NMRAM) by our partners by organizing and conducting an "All Hands" campaign of volunteers to collect NMRAM data using the latest version of NMRAM Field Guide for Lowland Riverine Wetlands Version 2.1, NMRAM Field Guide for Montane Riverine Wetlands Version 2.4, and NMRAM Field Guide for Playa Wetlands Version 1.2 (See appendices F2, F3 And F4). The data collection area for this project is restricted to central, northern and eastern New Mexico for logistical purposes.

Working collaboratively to further utilize the NMRAM for the State's Wetlands, SWQB Wetlands Program and NHNM will provide staff, coordination, training, and supplies to support approximately eight teams to conduct "All Hands" NMRAM volunteer data collection campaigns. The data collection days will focus on the lowland riverine wetlands subclass, the montane riverine wetlands subclass, and/or the playa wetlands subclass for data collection.

At least one team member from each volunteer team is expected to have been trained in the NMRAM appropriate to the target subclass and have basic New Mexico botany or hydrology/soils training. For each team, NHNM and SWQB will provide refresher training at the beginning of the campaigns with emphasis on data collection and field observation techniques. Teams will be composed of qualified citizens, federal, state, county and municipal agencies, non-profit and for-profit entities which will contribute in the data collection efforts. An All Hands Partner Planning Meeting will be conducted to recruit and organize volunteer teams. Teams will collect biotic and abiotic field data and complete electronic (or paper) field sheets for each location. Locations will be selected by the teams or assigned by NHNM staff. High quality sites will be targeted to increase the New Mexico set of "Reference Standard" or best sites assessed with NMRAM. Each site will be approved by the NHNM and SWQB Wetlands Program staff as fitting the subclass and will be located within the Rio Grande/Canadian/Upper Pecos or Southern High Plains reference domains.

NHNM will provide maps, materials and some supplies needed by the data collection teams to record data at the data collection sites. SWQB will provide two copies of the current relevant Field Guide, interactive data collection worksheets or paper worksheets, and the use of Munsell Soil Books (if needed) to each team for the data collection days.

The basic assumption underlying this rapid assessment method is that wetland condition will vary along a disturbance gradient and that the resultant state can be evaluated based on a set of landscape-level measurements in combination with visible field metrics and the characterization of stressors that affect wetland ecological integrity. The purpose of defining a subclass is to reduce the natural variability in wetland type as well as variability that occur with latitude, altitude, climate and geomorphology. The selection of Sample Areas (SAs) within the subclass for this project is focused on collection of rapid assessment data from the best available sites to increase our understanding of the subclass as a whole and to contribute to a set of "Reference Standards" or best sites for New Mexico.

A6 Project and Task Description

The primary goals of this project is to increase the use of NMRAM by our partners and to identify and assess wetland condition of "Reference Standard" sites within the Lowland Riverine, Montane Riverine and Playa Wetland subclasses of wetlands in New Mexico. The NMRAM is meant to provide a cost-effective tool to obtain information about the condition of wetlands that may be employed by a variety of users from different agencies and institutions. Additional objectives for NMRAM use during the "All Hands" campaign include identifying and evaluating 1) abundance, distribution and condition of wetlands

in the subclass within the region, including associated habitat, water quality, and flood control functions, above a threshold to maintain ecological services; 2) reference wetland conditions within the subclass; 3) wetland protection needs for the subclass; 4) potential wetland restoration parameters and metrics that may be used to measure wetland restoration effectiveness and recovery; 5) the effects of environmental stressors within the wetlands; and 6) locations to serve as restoration opportunities for the subclass within the region.

Task Description

1 NHNM/SWQB Planning Meeting: NHNM will meet with SWQB Wetlands Program Staff to review responsibilities and tasks, confirm timeline and prepare for All Hands Partner Planning Meeting.

2. All Hands Partner Planning Meeting: SWQB Wetlands Program Staff and NHNM will organize and conduct an NMRAM All-Hands planning meeting of participating government agencies, NGOs, and universities. Specific goals are to a) engage partners in the All Hands NMRAM field campaign; b) identify initial sites and target dates for assessment; c) evaluate training needs and identify NMRAM training opportunities to support the campaign, and d) develop an NMRAM All-Hands Field Data Collection Campaign Plan that is in keeping with goals and mission of the NMRAM and its partners.

3. QAPP: The SWQB Wetlands Program Coordinator will write the Project QAPP and will obtain EPA approval.

4. All-Hands NMRAM Campaign Preparation and Field Team Logistics: In accordance with the needs identified in the NMRAM All-Hands Field Data Collection Campaign Plan, NHNM will conduct a coordination meeting with volunteer participants and provide a refresher training focused on ensuring that participants understand the protocols for data collection. SWQB Wetlands Program staff will assist in the coordination meeting and the refresher training. NHNM will assist participants with GIS and site map development. NHNM will be responsible for sending information to participants including field supplies lists as the All Hands data collection field days approach. NHNM will provide protocols for contacting public and private land owners for site access, and a field safety plan for review by participants prior to performing field work. NHNM will inform participants regarding follow-up meetings and data collection results review.

SWQB Wetlands Program will provide two relevant Field Guides for the subclass of wetland of interest and enough data collection worksheets for each team. NHNM will assist teams with preparation of field packets for each of the sites including maps and directions to properties. Volunteer teams will be instructed to provide their own tools and other supplies. SWQB will provide Munsell Soil Books to Playa Wetlands Teams if necessary.

5. All-hands Field Campaign Coordination and Oversight: NHNM will provide a total of 8 ten-hour field days plus 4 days of travel for staff members to oversee training and data collection by participant teams. SWQB Wetlands Program will also provide trained staff for participation in data collection team oversight and training. Oversite staff will ensure that all data is collected according to the approved project QAPP, will provide refresher training as needed for the collection of data during the first day of team's campaign, and be available for volunteer questions and data review at the end of the first day. NHNM and SWQB will coordinate volunteer field team scheduling and training needs per the QAPP to ensure that all protocols are clearly understood and are consistent with the QAPP.

The field data collection teams will include a designated Team Leader in charge of QA/QC that will ensure that all data is collected at each field site and will then participate in a follow-up meeting. Approximately eight (8) teams total are expected to participate.

The Teams will obtain landowner permission for the field sites, arrange access, and schedule site entry in advance of the data collection days unless NHNM assigns their data collection sites for them. A template for Thank You notes will be provided to each Team Leader to be sent after data collection is completed. Landowner information will be kept on file as provided by collection teams for future data collection and participation time will be tracked as project match contribution by NHNM.

6. Follow-up Meeting: NHNM and SWQB Wetlands Program staff will conduct an indoor follow-up meeting/webinar with Participant Team Leaders and other team participants to review team results, address issues, discuss data output uses and results, plan for future "All Hands" efforts, and provide feedback.

7. Final Report: NHNM will prepare a final report with the following sections: 1) summary of project goals and objectives, 2) map of all sampling sites, 3) table of teams participating, team members, and subclass and sites visited by each team, 4) meeting notes, 5) notes and feedback from follow-up meeting, 6) suggestions for future "All Hands" efforts, and 7) NHNM will compile and deliver all data provided by each participant team as hardcopy or electronic data collection worksheets to SWQB Wetlands Program.

Table A6.1 Tasks, Timeline and Products

Task	Timeline	Products
SWQB/NMHM Planning Meeting	July 2019	Review tasks, responsibilities, confirm timeline, All Hands Partner Planning Prep.
All Hands Partner Planning Meeting	August 27, 2019	Invite participants, organize and conduct meeting, identify potential sites, evaluate training needs, develop plan with participants. Conduct refresher training.
Prepare QAPP	August 2019	QAPP prepared and forwarded to EPA for review and approval.
All Hands NMRAM Campaign Prep and Field Team Logistics	August-September 2019	Schedule Teams, assist in GIS and map development, contact landowners, provide field safety plan, provide materials and some supplies.
All-Hands Field Campaign Coordination and Oversite	Late September 2019 through May 2020.	Assist Teams with data collection on the first day, data review at end of first day.
All Hands NMRAM Volunteer Field Team Campaign	Late September 2019 through May 2020.	Data collection at; lowland riverine wetlands subclass, montane riverine wetlands subclass and/or the playa wetlands subclass
Follow-up Meeting	May 2020	Review results, address issues, discuss data output and results, plan for future All Hands.
Final Report	June 2020	Summary of Project Goals, maps, teams, meeting notes, feedback from follow-up meeting, Suggestions for future All Hands and datasheets provided by teams to NHNM.

A7 Quality Objectives and Criteria for Measurement Data

This section describes the data quality objectives of the project, identifies the targeted action limits and levels, and defines the measurement performance of acceptance criteria deemed necessary to meet those objectives.

The purpose of this project is to expend the knowledge of the condition of wetlands associated with lowland river systems, montane river systems and playas in New Mexico. Data quality will be measured against the quantitative and qualitative data quality indicators described below.

Table A7.1 Data Quality Indicators

Data Quality Indicator	Determination Methodologies
Precision	Precision will be ensured by training and consistently assigning the same staff the responsibilities of collecting, recording and analyzing data.
Accuracy	Accuracy is based on the use of methods determined to be reliable and tested through previous NMRAM development for each subclass and review of field inventory components.
Bias	Bias will be reduced by using professional and experienced staff to oversee the data collection and analysis.
Representativeness	Sample selection is representative of the varied continuum of reference conditions of each subclass of wetland needed to develop the methodology.
Comparability	Methods for data collection are standardized and reproducible from the development and adherence to this QAPP.
Completeness	Sites within the subclasses will be selected to assess the range of conditions recognized during the development of NMRAM for each subclass. All metrics data will be collected for each of the SAs to ensure completeness.
Sensitivity	Analyses will be conducted to ensure sensitivity of metrics to environmental conditions and recalibrated as applicable as part of the methodology development.

A8 Special Training Requirements/Certification

SWQB has qualified and experienced scientific staff, with expertise in GIS, wetland identification, Rosgen classification and methods, the development of rapid assessment methods, and southwestern riparian ecosystems to help carry out and administer this project. In addition, the SWQB Wetlands Program is using qualified contractor (Natural Heritage New Mexico) with extensive experience in New Mexico's wetlands and in the development of rapid assessments, biotic integrity, riparian vegetation and hydrology, and field work to carry out this EPA-funded Rapid Assessment of Wetlands, which will include a validation of spatial attributes applied to the assessment sites. The Assessment and Data Collection Teams for Rapid Assessment will be given a copy of this QAPP and will be instructed in appropriate data collection, validation and ground truth techniques through refresher training prior to data collection.

Maryann McGraw (WPC), received her bachelor's and master's degrees in geology form the University of Texas at Austin, and is an Environmental Scientist/Specialist Supervisor for SWQB. Maryann has been the principal investigator and contributing author for all NMRAMs to date. She has attended advanced training sessions in fluvial geomorphology assessment of stream conditions and departures conducted by Dave Rosgen, California Rapid Assessment Method (CRAM), HGM training, NWCA training and Stream Pyramid Training. The WPC has also participated in training and data collection for NWCA (2011), conducted greenline monitoring of riparian areas and SWQB photo monitoring protocols for other

wetlands projects. She participated in the development of the Rio Puerco Monitoring Manual. She worked for the Los Luna Plant Materials Center propagating wetland plants. She is qualified for developing the assessment criteria, conducting and participating in the training, and for overseeing and managing any of the monitoring procedures specified for this project.

Emile Sawyer serves as data collection technician for this project. He is an Environmental Scientist-Specialist and Wetlands Program team member for the Surface Water Quality Bureau, based in the Santa Fe Office. Prior to attending New Mexico Highlands University, where he earned his Environmental Science - Geology degree in 2003, Mr. Sawyer worked from 1992 to 2003 as a contract forestry technician throughout the Rocky Mountains. He earned his M.S. in Hydrogeology from the University of Nevada - Reno in 2009. Mr. Sawyer's graduate research at the Desert Research Institute in Reno, Nevada was based on using stable isotopes to track groundwater flow and evaluate a water balance model in the Colorado Flow System of eastern Nevada.

Contractor qualifications are documented through resumes and professional references. The qualifications have been reviewed by the SWQB WPC for this project. The documentation of this information will be kept in the SWQB project files managed by the File Manager. NHNM staff resumes were submitted with the project proposal to EPA and are available from the project File Manager.

A9 Documentation and Records

Copies of this QAPP and any subsequent revisions will be provided to all individuals included on the distribution list by the SWQB WPC. Signed Acknowledgement Statements will be kept in the project file by the File Manager.

The WPC will also distribute all applicable protocol documents and subsequent revisions used throughout the project to the appropriate contractors. NHNM will prepare and submit quarterly project reports. These will be submitted to NMED, in accordance with the approved QAPP. The QAPP, protocol documents and reports will be maintained on the SWQB WPC's hard drive, SWQB server (File Depot) and in the project file at SWQB Santa Fe, and at NHNM.

This QAPP includes references to protocols for the development and testing of written procedures for all methods, metrics and procedures or protocols related to the collection, processing, analyses, reporting and tracking of environmental data. All data generated from this project and covered by this QAPP will be of sufficient quality to withstand challenges to their validity, accuracy and legibility. To meet this objective, data are recorded in standardized formats and in accordance with prescribed procedures.

The documentation of all environmental data collection activities will meet the following minimum requirements:

1. Data, data collection and analytical methods, and associated information must be documented directly, promptly, and legibly.
2. All reported data must be uniquely traceable to the raw data. All data reduction/transformation formulae must be documented.
3. All original data records include, as appropriate, a description of the data collected, units of measurement, unique sample identification (Request Identification [RID] number), station or location identification (if applicable), name and signature or initials of the person collecting the data, and date of collection.

Any changes to the original (raw data) entry must be clear and not obscure the original entry. Taxonomic refinements and translational typographic errors will be corrected on the field datasheets and in the database, with clear documentation of what and by whom those changes were made.

A9.1 Reporting Format and Storage

All field data will be recorded each day and for each metric on project-specific field data sheets. The designated Team leader for each volunteer field crew will scan a representative set of field data sheets and email them to the SWQB WPC if they are willing to share their data (note: tribal teams may not). After the field work, the NHNM Project Coordinator will assign NHNM personnel to enter the data into the NHNM database. Typically, this task is assigned to several personnel to reduce fatigue. Assigned staff may include the NHNM Team Coordinator, Data Technicians, interns, or contractors (e.g. botanist). The personnel entering data from a datasheet will sign and date each sheet when it is complete. The NHNM database requires a username, password, and specific permissions to access and edit data, and tracks the username and date when records are added or edited. Once the data have been entered and corrected, the Project Coordinator will assign NHNM staff to scan the field data sheets if not already electronically generated; these will be delivered to the SWQB WPC. The Surface Water Quality Information Database (SQUID) is the central repository for NMRAM data at SWQB. NHNM will deliver the data into a geodatabase that includes all related tables and metadata to NMED for inclusion in SWQB project files until SQUID is prepared for Lowland Riverine, Montane Riverine and Playa Wetland NMRAM data entry. The SWQB WPC will ensure these data are entered into the Wetlands SQUID by December 2020. Copies of the paper datasheets will be kept in the project file at SWQB and at NHNM office. A list of SAs visited and site scores will be provided by the WPC to EPA Region 6 Wetlands Program as a deliverable attachment to the semi-annual reports. The data collection report produced by the NHNM and SWQB will include scans of the data collection worksheets in an appendix.

B Data Generation and Acquisition

B1 Sampling Design

The SA location for Lowland Riverine Wetlands, Montane Riverine Wetlands, and Playa Wetlands Subclasses will be selected in central, northern and eastern New Mexico for logistical purposes, access and to increase the New Mexico set of “Reference Standard” for each wetland subclass. These wetland subclasses were selected based on the SWQB prioritization of wetland types and:

1. existence of potential best available reference sites
2. access
3. potential for impairment by future stressors (anthropogenic activities)

The selection of Sample Areas (SA) for this project will focus on collection of rapid assessment data from the best available sites to increase our understanding of each wetland subclass as a whole and to contribute to a set of “Reference Standards” sites for New Mexico.

SA Locations will be selected by the volunteer teams (with prior approval from NHNM and SWQB Wetlands Program staff) or assigned by NHNM staff. High quality sites will be targeted to increase the New Mexico set of “Reference Standard” or best sites assessed with NMRAM. Each site will be approved by the NHNM and SWQB Wetlands Program staff as fitting the subclass and will be located within the Rio Grande/Canadian/Upper Pecos or Southern High Plains reference domains.

Metrics were selected by the SWQB Wetlands Team and NHNM staff during the development of the NMRAM by wetland subclass for testing in 2019-2020, these metrics have been incorporated into

electronic data collection worksheets (Appendix A in each NMRAM subclass Field Guide). Metrics represent relevant attribute categories such as Landscape Context, Size, Biotic, and Abiotic (Table B1.1) for each subclass of wetland (Lowland Riverine, Montane Riverine and Playa Wetlands). The metrics are measured using maps and aerial imagery or evaluated in the field. Landscape Context and Size metrics are assessed using maps and/or a GIS and these are termed "Level 1" metrics (Fennesey et al 2004). Landscape Context metrics usually are evaluating conditions surrounding the SA (the Buffer, Riparian Corridor, or Land Use Zone) and are preferably completed before going into the field to help familiarize the team with the site. Size metrics are also measured using maps. Level 1 metrics are also confirmed or modified as necessary during the field survey.

Table B1.1. List of NMRAM metrics by Subclass for "All Hands".

Level refers to measurement either in a GIS (1) or in	**Level**	**Module**		
		Montane	**Lowland**	**Playa**
Size				
S1. Absolute Playa Size	1			x
Landscape Context Metrics				
L1. Buffer Integrity Index	1	x	x	
L2. Riparian Corridor Connectivity	1	x	x	
L3. Relative Wetland Size	1	x	x	
L4. Surrounding Land Use	1	x	x	x
L5. Playa Configuration	1			x
Biotic Metrics				
B1. Relative Native Plant Community Composition	2	x	x	
B2. Vegetation Horizontal Patch Structure	2	x	x	
B3. Vegetation Vertical Structure	2	x	x	
B4. Native Riparian Tree Regeneration	2	x	x	
B5. Invasive Exotic Plant Species Cover	2	x	x	
B6. Annual Plant Abundance	2			x
B7. Wetland Species Index	2			x
B8. Vertical Habitat Disruption	2			x
Abiotic Metrics				
A1. Floodplain Hydrologic Connectivity	2	x		
A2. Physical Patch Diversity	2	x	x	
A3. Channel Stability	2	x		
A4. Stream Bank Stability and Cover	2	x		
A5. Soil Surface Condition	2	x	x	
A6. Channel Mobility	2		x	
A7. Playa Hydroperiod Reduction	1			x
A8. Soil Condition Index	2			x
A9. Water Source Augmentation	2			x
A10. Playa Watershed Connectivity	1			x
A11. Groundwater Connectivity	2		x	

In contrast, Biotic and Abiotic metrics are determined and evaluated in the field. Rapid field-based metrics are termed "Level 2" metrics. Biotic metrics may be based on floristic or wildlife data that represent habitat condition. Abiotic metrics may be based on hydrology, geomorphology, physical features, or soil conditions. Level 2 metrics are sensitive to disturbance and can be collected by using data collection methods or observations with direct results in the field or by matching features within the SA with narrative descriptions identified in past NMRAM's. Rapid assessments do not use methods that require lab analyses or other intensive methods which would be considered Level 3. In addition, a draft set of field-based stressor checklists grouped by attribute class (Playa NMRAM) or representing anthropogenic processes (Montane Riverine Wetland and Lowland Riverine Wetland) are completed during the field survey along with annotated field maps and documentary photographs. During the 2019-2020 data collection, the volunteer Field Teams will take additional notes and photographs to provide feedback to the Assessment Team during the follow-up meeting as to how the metrics are applied, details for describing the application of the metrics, stressors that are evident, and other comments that will help in the development of the NMRAM suite of metrics that evaluate wetland condition.

The NMRAM Field Guides for Lowland Riverine, Montane Riverine, and Playa Wetlands will provide procedures for conducting a rapid ecological assessment of wetlands in each subclass system. Field Guides will provide specific protocols and datasheets for evaluating wetland ecological condition using a combination of GIS-based measurements and field surveys. In addition to details on metric measurements, appendices will be provided that include at minimum, the data collection worksheets, a plant species list with wetland indicator status, an invasive plant species list and a glossary of terms.

Stressors will be evaluated and documented on the stressor checklist during the field survey. Maps will be annotated with data collection site details, changes to landscape and size metrics and other features of note in the SA and the surrounding buffer. Documentary photographs allow the Volunteer Field Team to relate findings back to the Assessment Team as well as supporting choices and data collected in the field. Documentary photographs are also taken of plant species that need further identification and as supporting documentation for plant communities identified in the SA. Photographs are used as supporting data collection and are generally not considered a metric or used as data by themselves.

Metric scores based on Level I analysis and field data (Level 2) are weighted by importance and rolled up into an attribute score (i.e., Size, Landscape Context, Biotic and Abiotic Scores) where A = Excellent (≥3.25-4.0); B = Good (≥2.5-<3.25); C = Fair (≥1.75-<2.5), and D = Poor (1.0 -<1.75). The rationale behind scoring procedures and the efficacy of any given metric will be provided in the NMRAM Manual Version 2.0.

A set of worksheets organized by attribute classes (Appendix A in each NMRAM subclass Field Guide) will be used for efficient data collection**.** These data collection worksheets will be provided as printable forms in Appendices of the Field Guides and as a downloadable fillable PDF file that computes and rates most metrics automatically and rolls up the scores for the user. The worksheet packets contain a cover worksheet for recording basic information, surveyor identification, and narrative descriptions of the SA by attribute. The worksheets together with maps and photographs make up the NMRAM Assessment Package for each wetland subclass that becomes the supporting record at a project level and the tool for data entry into SQUID. A Team Leader will check field sheets for accuracy and completeness prior to leaving the SA. A representative set of field sheets will be scanned and sent by designated Team Leader to the WPC and/or NHNM Program Manager for further inspection and review (note: tribal teams may not).

B2 Sampling Methods

The NMRAM sampling protocols identified in NMRAM Field Guides will be utilized in the collection of data for the Lowland Riverine, Montane Riverine and Playa Wetland Subclasses. Field Guides for each Subclass

includes written procedures for all methods and procedures or protocols related to the collection, processing, analysis, reporting and tracking of environmental data associated with each wetland subclass to accurately represent the condition of the wetland of interest. The metrics were designed to measure aspects of condition that are relative to the reference conditions based on the literature cited in the reference section of this QAPP, on previous testing and validation and on best professional judgment. The NMRAM data collection worksheets (Appendix A in each NMRAM subclass Field Guide) in F2, F3 and F4 will also be utilized for data entry into SQUID.

B2.1 Surface Water Sampling at Confined Riverine Wetland sites

No water samples will be taken for the NMRAM for Lowland Riverine Wetlands Montane Riverine Wetlands and/or Playa Wetlands.

B2.2 Field Health and Safety Procedures

The NHNM and SWQB Wetlands Program staff will supervise and assist volunteer data collection teams during NMRAM data collection field days. These will be scheduled during late summer 2019 through spring 2020. Field data collection will be scheduled to avoid thunderstorm activity and flooding, and in warmer weather while plants are more likely to be in bloom for purposes of identification.

Safety is of primary importance to field studies. Only sites that are safely accessible will be sampled. Unsafe sites include, but are not limited to, private lands not granting permission access, areas with evidence of illegal activities, exceptionally steep-sided and unstable slopes adjacent to rivers and acequias, and swift water and flooding.

In remote areas, the data collection team will always carry sufficient supplies of water, food, flashlights, shovels, extra spare tires, and first aid and emergency supplies to deal with accidents and unexpected circumstances, such as rapid changes in weather. Hard hats and closed-toe boots are required in burned or construction areas. Teams should have adequate communication devices for their location (cell phones, GPS, etc.). A field team will consist of at minimum a botanist, a hydrogeologist, and technical assistants. A designated crew leader will be determined by NHNM Project Coordinator and WPC during the Field Team training before data collection field trips, and will be responsible for field trip decisions, crew performance, and data compilation.

Any invasive species will be identified during data collection at the wetland SAs. Measures will be taken to prevent the carrying of seeds and propagules from site to site including the visual inspection and sterilization of shoes, clothes and equipment. Measures and procedures for invasive species control are included in the NMRAM for Lowland Riverine Wetlands Field Guide for users.

B2.3 Field Variances

As field conditions vary there may be the need for safety, common sense, or local site variables that prohibit or require minor adjustments to the sampling procedures and protocols. Such changes will be reported to the WPC and that information passed on to the QAO. If there is a deviation from the QAPP, the project manager/project coordinator must notify the QAO and provide written notification of the proposed changes and explanation on the reasoning behind the change. Upon the QAO's approval, modification to the QAPP will be sent to the US EPA for review and approval. Sampling problems, minor adjustments of field sampling, and QAPP modifications will be documented in any semi-annual reports to US EPA.

B2.4 Decontamination Procedures

Field equipment and shoes will be decontaminated between sites using a dilute bleach solution. This decontamination procedure is needed to prevent the spread of aquatic and terrestrial invasive species. Field clothing, including boots, will be decontaminated using a dilute bleach solution either in the field or by frequent laundry machine application. Disposal of decontamination fluids and rinse fluids is described below under “Disposal of Residual Materials”. Any gloves used during the sampling regime will be considered disposable and will be packaged for disposal appropriately between sites.

B2.5 Disposal of Residual Materials

In the process of sampling there may be a small amount of waste, including used personal protective equipment (PPE). The US EPA's National Contingency Plan requires that management of the wastes generated during sampling comply with all applicable or relevant and appropriate requirements to the extent practicable. Residuals generated for this project will be handled in a manner consistent with the Office of Emergency and Remedial Response (OERR) Directive 9345.3-02 (May 1991), which provides the guidance for the management of wastes. In addition, other legal and practical considerations that may affect the handling of the wastes will be considered, as follows:

Used disposable containers or disposable equipment will be bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any used disposable containers or disposable equipment (even if it appears to be reusable) will be rendered inoperable before disposal in the refuse dumpster.

Decontamination fluids generated in the sampling event could consist of water and bleach. Decontamination fluids will be disposed into a municipal sewerage or onto an impervious surface for evaporation, at least 50 m from the nearest surface water.

B3 Sample Handling and Custody

No samples are expected to be collected for analysis at a laboratory for this project.

B4 Field Measurement Methods

Relevant metrics using Rosgen Level 2 geomorphology surveys techniques, such as cross-sections may be conducted at selected 2019-2020 SA locations that utilize the Montane Riverine Wetland NMRAM Field Guide only. Methodology will follow the guidelines described in the Field Guide. Surveys will be located by GPS points for future data collection efforts to ensure repeat surveys are recreated accurately.

Plant communities will be documented using photographs and recorded on the data collection worksheets throughout each individual SA for the project. Photograph site locations will be recorded using a GPS to ensure accurate creation of the plant community map. Photo documentation will occur throughout the course of the project. Other documentary photographs include transect locations upstream, downstream from bank to bank. Photograph documentation details will be recorded on the data collection worksheets on designated photo-documentation pages.

B5 Quality Control

Quality control (QC) activities are technical activities performed on a routine basis to quantify the variability that is inherent to any environmental data measurement activity. The purpose for conducting QC is to understand and incorporate the effects the variability may have in the decision-making process. Additionally, the results obtained from the QC analysis, or data quality assessment, may identify areas where variability can be reduced or eliminated in future data collection efforts, thereby improving the overall quality of the project being implemented. Many of the proposed metrics consist of observation

data including plant species lists and site geomorphology. To ensure quality control for these observational data, the data collection team will have subject matter experts. For example, the team will include a trained or degreed botanist and hydrogeologist to eliminate errors.

B5.1 Field Sampling Quality Control

All Volunteer Data Collection Team members who collect environmental data must be trained in the use of the metric protocols and will collect data in accordance with the procedures as they are defined in the NMRAM Field Guides, Field Sheets and at the training session. Training session will be led by one of the following project staff: SWQB WPC, SWQB Wetland's Team, NHNM Project Manager or NHNM Project Coordinator

Several potential metrics lend themselves to observer bias, particularly estimation and measurement of vegetation cover and land use cover. Density estimation sheets are useful for training and calibration of field team members and will be part of the NMRAM Field Guide if other sources are not available.

B5.2 Data Entry Quality Control

Field sheets will be organized, reviewed for completeness and placed in a labeled file folder by the designated team leader. The fillable PDF data collection worksheets flag entries or values that are not consistent with that expected for the metric. NHNM trained support staff will enter the data into NHNM database other than the individual who filled out the field sheet. Should any questions arise, the data entry personnel will add a note to the field sheet and contact the field team member to answer that question. When each data point from a page has been addressed, the data entry staff person will sign and date the field sheet. The NHNM Project Coordinator or the WPC will review all data, using standardized exported reports that identify missing values and outliers.

B6 Instrument/Equipment Testing, Inspection, and Maintenance

The NHNM Team Coordinator or designated Volunteer Team Leader are responsible for inspecting equipment and supplies before the data collection team leave for field data collection and upon return to office.

B7 Instrument/Equipment Calibration and Frequency

Rosgen Level 2 measurements collected by the teams utilizing the NRAM Montane Riverine Wetland Field Guide will be limited to those that can be collected using a tape measure and level. There are no instruments/equipment that require calibration.

B8 Inspection and Acceptance of Supplies and Consumables

B8.1 Field Sampling Supplies and Consumables

The NHNM Team Coordinator is responsible for preparing supplies checklists and informing the Volunteer Data Collection Team leader of needed supplies and equipment for each field sampling trip. Volunteer field sampling supplies and consumables are checked at the end of every field trip by the designated Team Leader. Replacement supplies and consumables are purchased as needed and checked before the next field trip. All team members are expected to be familiar with the equipment and supplies needed for an individual trip. A copy of the checklist is reviewed and completed during trip planning.

B9 Non-Direct Measurements

Printed field maps for each SA are an integral part of the NMRAM Assessment Package. Printed field maps will be prepared for each SA by the Volunteer Team or by NHNM Project Coordinator. Two different map formats are required to support field mapping and the field survey; 1) A map at approximately 1:6000-

10000 scale that shows the SAs in a landscape context. This map should delineate the maximum extent of a potential buffer and land use index area. 2) a map that encompasses a single SA at between 1:1500-3000 scale for mapping vegetation communities, abiotic features and transect locations. Two copies of the field maps are required, one for measuring biotic metrics and one for measuring abiotic metrics. Modifications to the SA boundary will be recorded on the SA abiotic map.

B10 Data Management

Data obtained for this project are maintained in a relational database and GIS electronic files at NHNM and SWQB. All electronic data will be filed and labeled in a consistent manner. All data will be delivered to the WPC as soon as practical following data collection event. All data are secured through password protection and are unavailable to unauthorized users, to protect from accidental manipulation. Exported geodatabases that are delivered to the SWQB contain metadata that includes the date of export. Data transmitted to the SWQB are available at NHNM, on the SWQB hard drive, SWQB server (File Depot) and in hard copy form as Wetlands Program files that are maintained by the SWQB File Manager.

NHNM will provide summary reports to the SWQB WPC. All data and summary reports will be compiled into the quarterly reports and final project report and provided to US EPA Region 6 Wetlands Program.

B10.1 Data Acquisition, Direct Measurements

Expeditious data entry helps ensure field team memory of site-specific details, and ability to respond to questions by the WPC and NHNM project managers about questionable data**.**

NMRAM protocol follows three data acquisition principles:

1. It should be highly efficient, requiring no more time to enter the data than it did to collect them.
2. The data entered should be restricted to assure accuracy and consistency, with terminology, scientific names, and responses limited to values in lookup tables, yet have the flexibility to allow for anomalous occurrences.
3. Users must be able to easily export meaningful data.

C Assessment and Oversight

C1 Assessment/Oversight and Response Actions

The SWQB WPC provides project oversight by reviewing data collection efforts. The NHNM Project Manager and Project Coordinator provide day-to-day oversight including adherence to this QAPP. Any problems encountered during the course of this project will be immediately reported to the SWQB WPC, who will consult with appropriate individuals to determine appropriate action. Should the corrective action impact the project or data quality, the SWQB WPC will alert the QAO. If it is discovered that NMRAM methodologies must deviate from the approved QAPP, a revised QAPP must be approved before work can be continued. All problems will be documented for inclusion in the project file, with quarterly reports and the final report. The SWQB will assess project progress to ensure the QAPP is being implemented, including periodic audits by the QAO, as needed. Those assessments and any problems will be reported by the SWQB WPC to the QAO.

C2 Reports to Management

Quarterly reports will be prepared and reviewed internally by the NHNM Project Coordinator and presented to the SWQB WPC for review. Any deviations from the specifications in the NHNM Memorandum of Agreement for this project will be documented and reported to WPC. Following inclusion

of SWQB review comments, NHNM Project Coordinator will submit finalized reports to the SWQB WPC, who will summarize those reports in Project Semi-Annual Reports to the US EPA Grants Project Officer, to show project accomplishments, data acquisition and entry, and to provide a venue to bring up any issues with the project. The reports will allow the US EPA to assess the productivity of this Wetlands Project and be kept informed on the progress of the project. A report detailing the findings will be provided in the final project report to US EPA by SWQB WPC. The NMRAM Manual will serve as major documentation of the NMRAM for Lowland Riverine, Montane Riverine and Playa Wetlands, and will relate the findings to several different NMRAMs, covering different wetlands types in New Mexico.

D Data Review and Usability

D1 Data Review, Verification, and Validation Requirements

Prior to using the data for wetlands protection, policy, or public uses, the quality of the data will be reviewed and evaluated, as described in Sections B10.1 and C1, above. Data are compiled from field sheets, reviewed and verified by NHNM staff that did not enter those data, and re-verified and validated by NHNM Project Coordinator. Errors will be corrected where possible and rejected and reported upon by the NHNM if questions about those data cannot be satisfactorily answered. Additional review, verification, and validation will be completed by SWQB WPC before upload into SQUID. Standardized and randomized checks of data entry, field calibration of instrumentation, and technician training will be conducted and reported upon by the NHNM, and data error levels above 1% will not be accepted. These data review, verification, and validation efforts will ensure the Volunteer Teams under the guidance of NHNM and SWQB Wetlands Program Staff provide high quality assessment data to SWQB.

D2 Verification and Validation Methods

Defining the data verification and validation methods helps ensure that project data are evaluated in an objective and consistent manner. For the current project, such methods have been described in Section D1 (above) for information gathered and documented as part of the field measurement activities.

D3 Reconciliation with User Requirements

NHNM, in collaboration with SWQB Wetlands Program, will use the assembled All Hands data and analyses to clarify issues related to protocol adequacy, completeness, and efficiency. The data assembled through the larger inventory and assessment will be used to further those analyses, and to address the question of the applicability of the methods to demonstrate the utility of the NMRAM for Lowland Riverine, Montane Riverine and Playa Wetlands in New Mexico. Critical analyses here will include the adequacy of the methods for identifying individual sites that are exemplary and of use as reference sites, sites at which management attention is warranted, and site at high levels of risk due to anthropogenic impacts. Such analyses will be conducted using ranked, non-parametric statistical analyses, and multivariate analyses of the diverse physical, and biological ranking. These analyses will help clarify the utility of the project to meet the management and policy needs of the State of New Mexico.

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Appendices

Appendix F1 Acknowledgement Statement

New Mexico Environment Department Surface Water Quality

Planning and Conducting "All Hands" Rapid Assessment Method Data Collection Campaign for the Assessment of New Mexico Wetlands

Quality Assurance Project Plan Acknowledgement Statement

This is to acknowledge that I have received a copy of the QAPP for **Planning and Conducting "All Hands" Rapid Assessment Method Data Collection Campaign for the Assessment of New Mexico Wetlands**

As indicated by my signature below, I understand and acknowledge that it is my responsibility to **read, understand, become familiar with and comply** with the information provided in the document to the best of my ability.

_____

Signature

_____

Name (Please Print)

_____

Date

Return to SWQB Wetlands Program Coordinator (Maryann McGraw)

NEW MEXICO RAPID ASSESSMENT METHOD

Lowland Riverine Wetlands

Data Collection Worksheets

Please see the Field Guide for Lowland Riverine Wetlands (version 2.1) Appendix A (version 1.3). If needed please contact Maryann McGraw (maryann.mcgraw@state.nm.us) or Elizabeth Milford (Emilford2@gmail.com) for additional information.

NEW MEXICO RAPID ASSESSMENT METHOD

Montane Riverine Wetlands

Data Collection Worksheets

Please see the Field Guide for Montane Riverine Wetlands (version 2.4) Appendix A (version 2.3). If needed please contact Maryann McGraw (maryann.mcgraw@state.nm.us) or Elizabeth Milford (Emilford2@gmail.com) for additional information.

NEW MEXICO RAPID ASSESSMENT METHOD

Playa Wetlands

Data Collection Worksheets

Please see the Field Guide for Playa Wetlands (version 1.2) Appendix A (version 1.2). If needed please contact Maryann McGraw (maryann.mcgraw@state.nm.us) or Elizabeth Milford (Emilford2@gmail.com) for additional information.